PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 : B25D 17/04 — A1

(11) International Publication Number: WO 93/11912

(43) International Publication Date: 24 June 1993 (24.06.93)

(21) International Application Number: PCT/GB92/01954

(22) International Filing Date: 23 October 1992 (23.10.92)

(30) Priority data:
9126139.6 7 December 1991 (07.12.91) GB

(71) Applicant *(for all designated States except US)*: THOR TOOLS LIMITED [GB/GB]; P.O. Box 20, North Shields, Tyne & Wear NE30 5RB (GB).

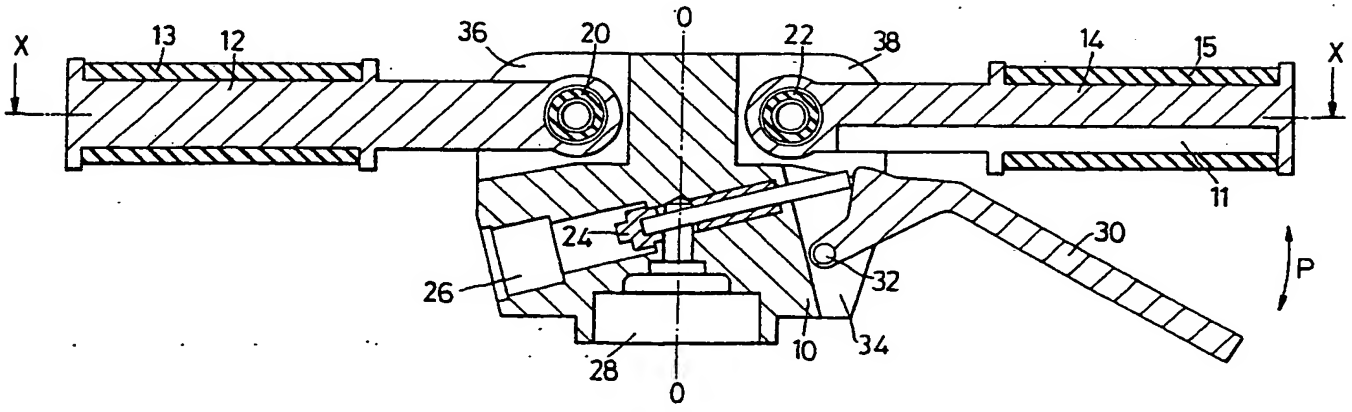
(72) Inventor; and
(75) Inventor/Applicant *(for US only)* : DAVISON, Alan, John [GB/GB]; 10 South Parade, Guide Post, Choppington, Northumberland NE62 5RB (GB).

(74) Agents: TREVES, Barry, William et al.; BTR Group Patent & Trade Mark Service, P.O. Box 504, Erdington, Birmingham B24 9QH (GB).

(81) Designated States: JP, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, SE).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: HANDLE ASSEMBLY



(57) Abstract

An anti-vibration handle assembly comprises a handle mounted on a cylindrical bush connected to the tool. The bush may be a standard METALASTIK® bush comprising an inner steel tube (connected to the tool), an outer steel tube (connected to the handle) and an intermediate layer of vibration-damping elastomer. Preferably means are provided to prevent movement of the inner tube with respect to the tool during use.

HANDLE ASSEMBLY

This invention relates to a handle assembly for a vibratory percussive tool. More particularly the invention relates to a handle assembly for lessening or damping the vibration which would otherwise be transmitted from the tool to the operator holding the handle.

In accordance with the invention a handle assembly for a vibratory percussive tool comprises a handle which is gripped by the hand of an operator in use of the tool and which extends perpendicularly to the direction along which a percussive vibratory force is applied by the tool and a single cylindrical bush for connecting the handle to the tool, the cylindrical bush comprising an inner tube for fixing to the tool, an outer tube coaxially positioned to surround the inner tube and to which the handle is fixed, and a cylindrical layer of vibration-damping material sandwiched between the inner and outer tubes to dampen the rotational movement of the outer tube with respect to the inner tube, the axis of the bush extending substantially perpendicularly to said direction, the handle axis extending perpendicularly to the axis of the bush, whereby in use of the tool, the handle and the outer tube to which it is fixed tends to pivot about the inner tube and the axis of the bush, the pivoting movement of the handle being dampened by the layer of dampening material sandwiched between the inner and outer tubes.

Preferably the dampening material comprises an elastomer e.g. a rubber compound, bonded to the inner and outer tubes.

Preferably also the assembly comprises two handles each connected to the tool by means of an associated single bush. Each handle is preferably mounted with the handle axis passing through the associated single bush and may extend radially outwards from the axis of the tube on which it is mounted.

of the hammer tool by means of bolts (not shown) passing through apertures 17,19, one each in two, lugs 16,18 one at each side of the backhead 10. Housed within the backhead is valve 24, operated by means of a lever 30, for controlling the flow of air under pressure from an inlet 26 at one side of the backhead and then through an outlet 28 to the body of the tool. The lever 30 is mounted on a pivot 32 in a recess 34 formed in the backhead 10 adjacent to one of the handles 14, and is positioned beneath the handle 14 so that in use the operator holding the handle may also simultaneously move the lever as indicated by the arrow P. At the upper extent of its travel the lever will be positioned in an elongated recess 11 formed on the underside of the handle 14.

The two handles 12 and 14 are mounted one on each side of the backhead, opposite to one another, and extend coaxially outwardly generally perpendicularly to the axis 0-0 of the tool and backhead 10. The outer part of each handle 12 or 14 is provided with a suitable grip 13, 15 and the inner part is positioned within an associated recess 36, 38. The inner part is formed with a bore the axis of which extends perpendicularly to the axis of the handle and to the axis 0-0 of the tool. The bore of each handle receives one of the two connecting bushes 20 or 22.

As can be seen especially in Figure 2 flanges 42,44,46,48 are formed at the sides of the recesses each of which receives the inner part of one of the two handles 12,14. The flanges 42,44,46, 48 are formed with suitable apertures which receive bolts 80,82 which pass through the centres of the connecting bosses 20,22 to hold them into position in the backhead. Nuts 84,86 are positioned one on each bolt.

Each connecting bush 20,22 is the same and is illustrated in detail in Figures 3 and 4. Each comprises a central cylindrical steel tube 50 having a length equal to the width of the recess 36 or 38

apertures in the flanges. The end faces of the connecting bushes 20,22 are also formed with steps 70 which are complementary to the shoulders 74,76. One half of the central tube 50 is thus longer than the other half. The two lengths match the distances between the inner faces of the flanges 42,44 and 46,48 on either side of the shoulders 74,76.

When assembled the shoulders 74,76 abut the steps 70 thus preventing the inner tube 50 and the remaining parts of the connecting bush 20,22 and the handle 12,14 rotating relative to the respective bolt 80,82 in use. The bolts may be replaced by Spirol (Trade Mark) coiled pins (not shown) making the handle assembly simpler, cheaper and easier to assemble.

The assembly of the second embodiment of the invention, shown in Figures 8 and 9, comprises a backhead 110 (the upper part of the vibratory percussive e.g. hammer tool), two handles 112, 114 extending outwardly from the backhead 110, and two bushes 120, 122 within the backhead and on each of which a handle 12 or 14 is mounted.

The backhead 110 is in the form of a metal casting and is shaped to fit at the end or top of the hammer tool by means of bolts (not shown) passing through apertures 117, 119, one in each of two lugs 116, 118, one at each side of the backhead 110. Housed within the backhead 110 is a valve 124, operated by means of a lever 130, for controlling the flow of air under pressure from an inlet 126 at one side of the backhead and then through an outlet 128 to the body of the tool.

The lever 130, positioned above the handle 114 is welded to a web 131 which pivots freely about the bush 122 and passes through a vertical slot in the inner part of the handle 114. A shoulder 133 formed near the lower extremity of the web abuts a protruding part 135 of the valve 124. When fully depressed the lever 130 lies along the upper surface of the handle

axis A-A from the respective bushes 120 and 122 and form head portions 152 and 154. As the handles 112 and 114 pivot about the bushes 120 and 122 the head portions abut one or other of the shoulders in the associated recess so the shoulders provide limiting means to limit the amount of movement of the handles. The position of the handles 112 and 114 as shown in Figure 8 are the positions before the tool is used. As can be seen both handles are at their upper limits of possible movement since the head portions 152 and 154 abut the lower shoulders 143 and 147 respectively.

The backhead 110 of the second embodiment is provided with a cover plate 160 held in place by four screws 161, 162, 163 and 164, the cover plate covering an oil reservoir 167. In the centre of the cover plate is a cover screw 165, provided with a seal 167, which can be removed to fill the reservoir. Oil from the reservoir flows to the valve 124 through felt wicking 168 which controls the oil flow. In practice the oil reservoir is topped up at the beginning of each working shift or day.

In use of both embodiments of the invention as the main body of the tool and the backhead vibrates in a vertical direction (generally along axis 0-0 in Figure 1 and axis A-A in Figure 8), the handles 12, 14 or 112, 114, held by an operator, pivot on the respective bushes 20, 22 or 120, 122. The elastomer in the bushes is placed in torsional shear (rather than in compression or tension) and acts as a shock absorber to dampen vibration which would otherwise be transmitted to the handles and hence to the operator.

In particular the construction and arrangement of each embodiment described and illustrated provides for a relatively large amount of movement in the handle at the part where it is held by the operator. This is important for the absorption of low frequency vibration which would otherwise be transmitted from a tool of this nature.

CLAIMS:

1. A handle assembly for a vibratory percussive tool comprising a handle which is gripped by the hand of an operator in use of the tool and which extends perpendicularly to the direction along which a force is applied by the tool and a single cylindrical bush for connecting the handle to the tool, the cylindrical bush comprising an inner tube for fixing the tool, an outer tube coaxially positioned to surround the inner tube and to which the handle is fixed, and a cylindrical layer of vibration-dampening material sandwiched between the inner and outer tubes to dampen the rotational movement of the outer tube with respect to the inner tube, the axis of the bush extending substantially perpendicularly to said direction, the handle axis extending perpendicularly to the axis of the bush, whereby in use of the tool, the handle and the outer tube to which it is fixed tends to pivot about the inner tube and the axis of the bush, the pivotal movement of the handle being dampened by the layer of dampening material sandwiched between the inner and outer tubes.

2. A handle assembly according to Claim 1 wherein the dampening material comprises an elastomer bonded to the inner and outer tubes.

3. A handle assembly according to Claim 2 wherein the elastic material comprises a rubber compound bonded to the inner and outer tubes.

4. A handle assembly according to any one of the preceding claims comprising two handles each connected to the tool by means of an associated single bush.

5. A handle assembly according to Claim 4 wherein each handle is mounted to extend substantially radially outwards from the axis of the tube of the bush on which it is mounted.

6. A handle assembly according to Claim 1, comprising means for preventing the handle from rotating with respect to the outer tube of the bush to which

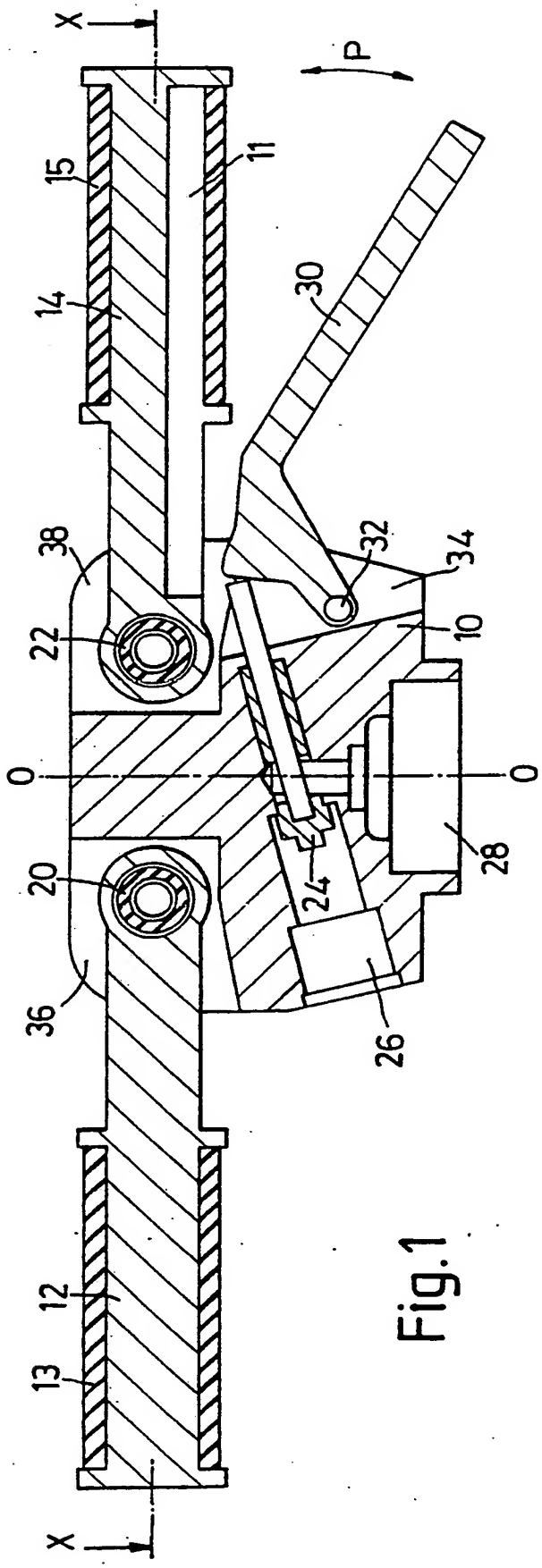

X
P
15
11
14
30
38
32
34
22
10
0
0
20
24
28
36
26
12
13
X

Fig.1

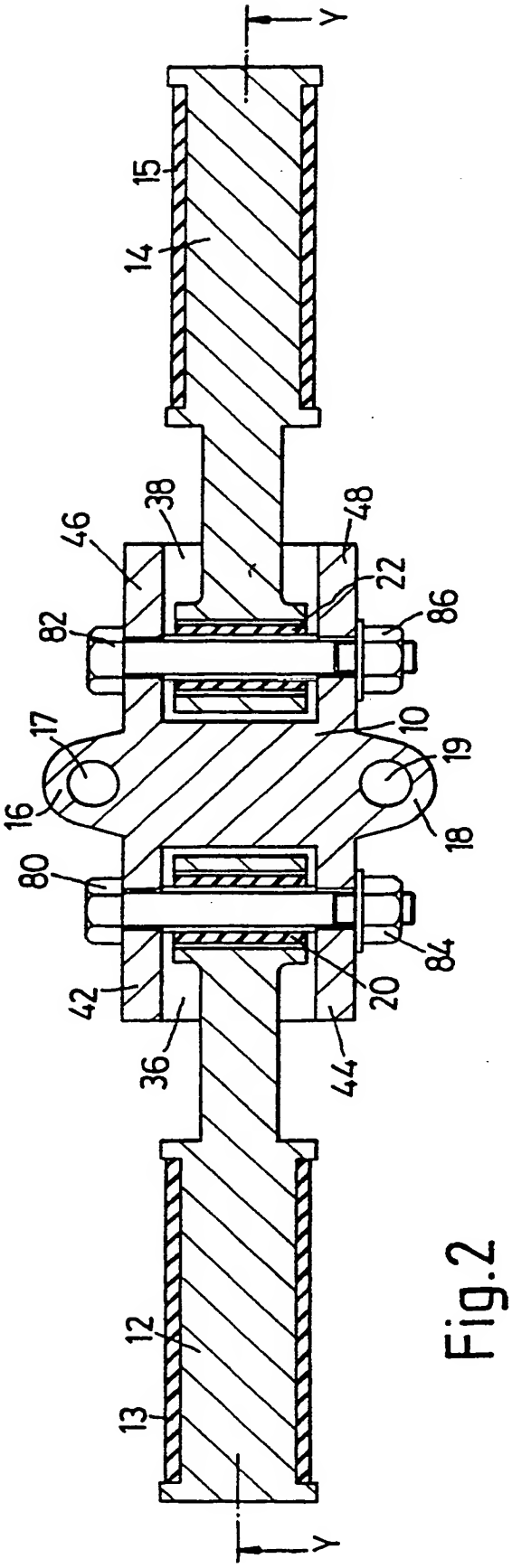

Y
15
14
38
46
48
22
82
86
17
10
19
16
18
80
84
20
42
36
44
12
13
Y

Fig.2

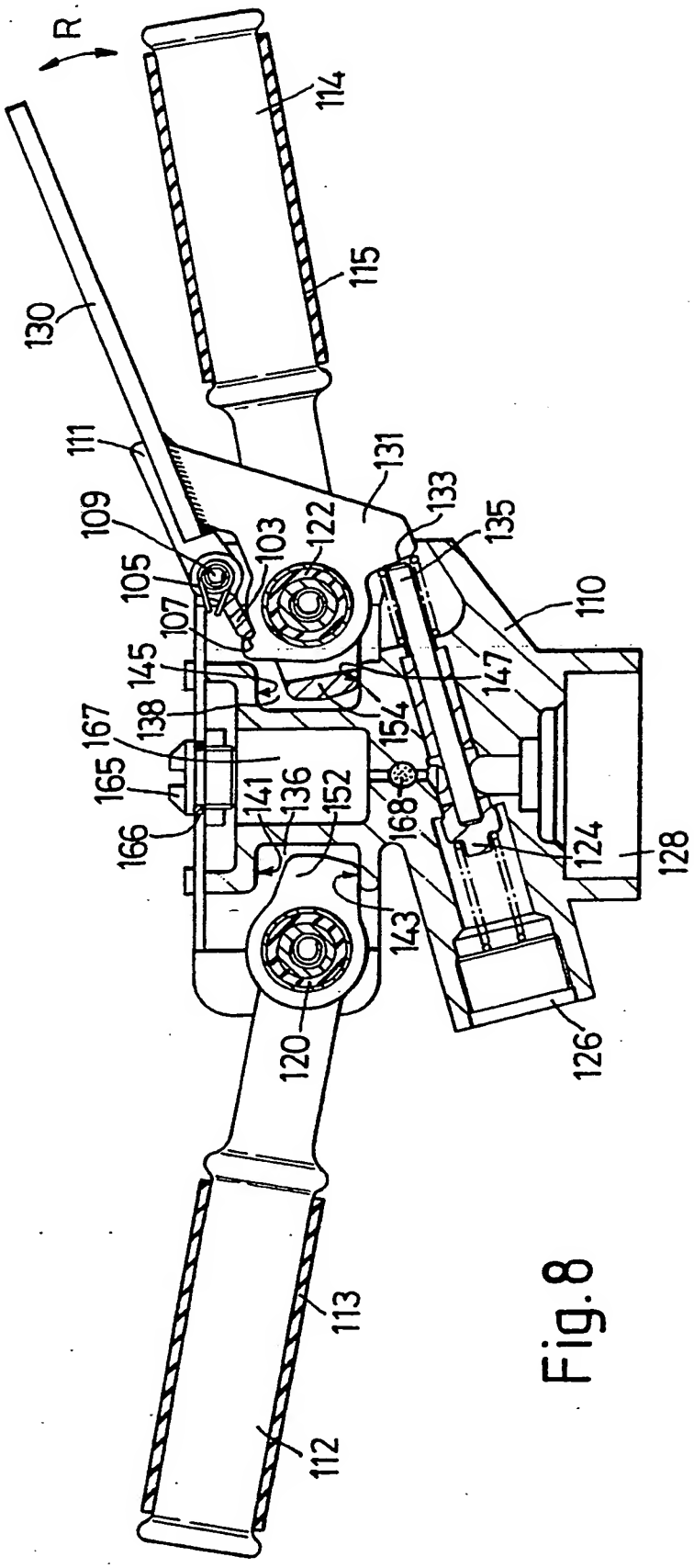

R
114
115
130
111
131
133
135
109
103
122
105
107
110
145
147
138
154
167
165
141
136
152
168
166
124
128
143
120
126
113
112

Fig.8

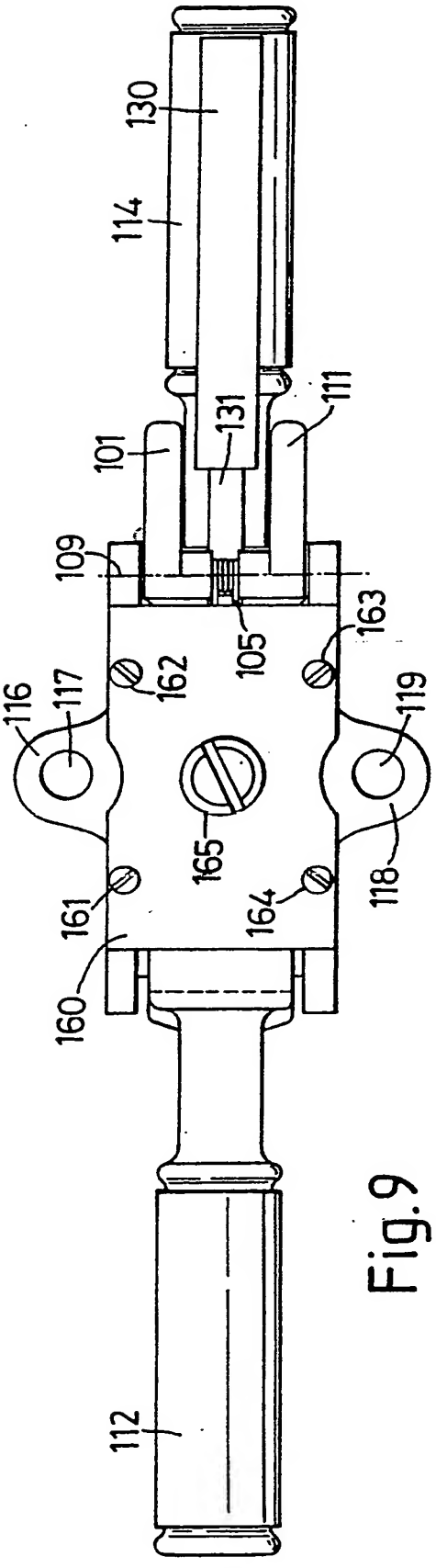

130
114
111
131
101
109
105
163
162
116
117
119
165
118
161
164
160
112

Fig.9

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	GB,A,2 138 348 (ANDERSSON) 24 October 1984 see abstract; figures	1
A	EP,A,0 294 351 (A/S WEJRA) 7 December 1988 see abstract; figures	1